Comments on ModeS-WP02-08
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- ED-73B does not have a section equivalent to DO-181C section 2.3 equipment performance under environmental conditions.
- ED-73B section 5.4 compares to DO-181C section 2.4 NOT section 2.3. Manufacturers would like to see a section in ED-73(X) which will be equivalent to DO-181(X) section 2.3 for environmental conditions.
- There is a Group 5 in DO-181C. Group 5 in ED-73B is similar to Group 1. It should be renamed as Group 1a or Group 7.
- DO-181C section 2.4 ambient condition tests are more stringent than section 2.3 for environmental conditions. Some of the examples are:

2.3.2.7 standard interference at only 3 power level -21, -50 and -68 dBm, P5 test at 2 power levels	2.4.2.7 has 4 steps, asynchronous interference, standard interference pulse at 9 power levels, P5 test at 10 power levels, pulse pair interference at 9 power levels and DME/JTIDS interference test
2.3.2.4 SLS has 4 steps	2.4.2.4 SLS has 7 steps
2.3.2.5 PDC has 6 steps	2.4.2.5 PDC has 10 steps
2.3.2.6 TRD has 4 steps	2.4.2.6 TRD has 7 steps

- The differences between DO-160D and ED-73B during vibration environment are: Group 1 during and after versus Group 3 during and Group 1 after, which are significant. Group 1 takes 20 times longer than Group 3 with the automated test equipment available today and there are at least 10 vibration test conditions (Sine X, Rand X, Sine on rand X etc). Transponder is exposed to the environment longer with ED-73B.

- During lightning induced transient susceptibility ED-73 requires Group 5 test is similar to Group 1 test. Since the test involves IO pins of transponder, a IO test along with Group 3 would be appropriate.

The required tests for each Group are defined in the following table which combines the requirements from DO-181C, and ED-73B:

DO-181C para.	ED-73B para.	DESCRIPTION	REQUIRED ENVIRONMENT TEST GROUPS					
			1	2	3	4	5	6
2.4.2.1	5.4.1	Receiver Characteristics	x	x	x			
2.4.2.2.1	5.4.2.1	Reply Transmission Frequency	x	x	x	x		
2.4.2.2.2	5.4.2.2	RF Peak Power Output	x	x		x		
2.3.2.2.3	5.4.2.5	Reply Rate Capability	x					
2.4.2.3	5.4.3	Reply Pulse Characteristic	x			x		
2.4.2.4	5.4.4	Side Lobe Suppression	x	x				
2.4.2.5	5.4.5	Pulse Decoder Characteristic	x	x				
2.4.2.6	5.4.6	Transponder Recovery and Desensitization	x					
2.4.2.7	5.4.7	Standard Interference Pulse	x					
2.4.2.8	5.4.8	Undesired Replies	x	x	x		x	
2.4.2.9	5.4.9	Self-Test and Monitors	x	x	x	x	x	
2.4.2.10	5.4.10	Mutual Suppression Capability	x					
2.4.2.11	5.4.11	Diversity Operation	x	x				
2.4.2.12	5.4.12	Data Handling & Interfaces	x	x				
2.4.2.12.5	5.4.13	Interface Integrity Testing	x	x				
2.3.2.12	5.4.14	Restoration of Power	x	x			x	
	4.2.1.b	Ensure Mechanical Devices Operate Satisfactorily	x	x	x	x		
		Input/Output Testing (SRD)	x	x	x			

EQUIPMENT PERFORMANCE – ENVIRONMENTAL CONDITIONS

The following table relates the Environmental Conditions to the required test Groups as defined by DO-181C and ED-73B combined:

RQMT	ENVIRONMENTAL CONDITION	DO-160D PARAGRAPH	GROUPS	COMMENTS
(1)	Temperature	4.5	1	
(2)	Altitude	4.6.1	4	
(3)	Decompression & Overpressure	4.6.2-4.6.3	4	
(4)	Temperature Variation	5.0	3	
(5)	Humidity	6.0	2	
(6)	Operational Shock	7.2	2	
(7)	Crash Safety	7.3	6	No Transponder Tests
(8)	Vibration	8.0	1	During and after
(9)	Explosion	9.0	6	No Transponder Tests
(10)	Waterproofness	10.0	2	Drip Proof Test
(11)	Fluids Susceptibility	11.0	2	Not Required
(12)	Sand and Dust	12.0	2	Not Required
(13)	Fungus Resistance	13.0	2	Not Required
(14)	Salt Spray	14.0	2	Not Required
(15)	Magnetic Effect	15.0	6	No Transponder Tests
(16)	Power Input	16.0	2	During and after
(17)	Voltage Spike	17.0	2	
(18)	Audio Frequency Conducted Susceptibility	18.0	1	
(19)	Induced Signal Susceptibility	19.0	1	
(20)	RF Susceptibility	20.0	1	
(21)	Emission of RF Energy	21.0	6	No Transponder Tests
(22)	Lightning Induced Transient Susceptibility	22.0	1	After test
(23)	Electrostatic Discharge	25.0	1	After test